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| 09/579,576 | 05/25/2000 | Ho-Jin Kweon | 003364.P048 | 7384 |

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| EXAMINER |
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WILLS, MONIQUE M

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| ART UNIT | PAPER NUMBER |
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1745

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06/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/579,576

Applicant(s)

KWEON ET AL.

Examiner

Monique M. Wills

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1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5,29,30 and 33-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5,29,30 and 33-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 May 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

This Office Action is responsive to the Amendment filed March 21, 2007. The following rejections are overcome:

- Claims 5, 29, 30, 33 & 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka U.S. Patent 5,869,208, in view of Tsukamoto U.S. Pat. 7,101,642.
- Claim 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saidi et al., U.S. Patent 5, 851,696 in view of Tsukamoto U.S. Pat. 7,101,642 and further in view of Matsubara U.S. Pub. 2001/0010807.
- Claims 5, 29, 30, 33 & 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Saidi et al., U.S. Patent 5, 851,696 in view of Tsukamoto U.S. Pat. 7,101,642.

However, the pending claims are newly rejected as follows:

- Claims 5, 29, 30, 33 & 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka U.S. Patent 5,869,208, in view of JP 1998-288495.
- Claim 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saidi et al., U.S. Patent 5, 851,696 in view of JP 1998-288495 and further in view of Matsubara U.S. Pub. 2001/0010807.

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- Claims 5, 29, 30, 33 & 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saidi et al., U.S. Patent 5, 851,696 in view of JP 1998-288495.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 29, 30, 33 & 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka U.S. Patent 5,869,208, in view of JP 1998-288495.

With respect to claim 5, Miyasaka teaches: a physical mixture of a lithiated transition metal compound (col. 11, lines 10-20); a powder metal including *aluminum* (col. 8, lines 10-15); a carbon black conductive agent (col. 8, lines 5-10); a binder (col. 8, lines 30-45); an organic electrolyte solution (col. 8, lines 48-53); the active material includes LiCoO_2 , embracing formula 7, when B is Co and A is O (col. 5, lines 15-25); and the metal additive is 2 to 15 wt % of the active material (col. 8, lines 15-20). The electrode material is coated on the current collector prior heat treatment. See col. 10, lines 15-20. With respect to claims 29 & 30, the active material includes LiCoO_2 embracing LiBA_2 and $\text{LiBO}_{2-z}\text{A}_z$ when B is Co and A is O (col. 8, lines 15-25). With

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respect to claims 33 & 34, the active material is LiCoNiO_2 , embracing LiNiCoA_2 and $\text{LiNiCoO}_{2-z}\text{A}_z$ when A is oxygen (col. 8, lines 15-25).

Miyasaka is silent to an electrode additive of at least one of Si, B, Ti, Ga, Ge, Ca, Mg, Sr and Ba (claim 5). The reference does not expressly disclose heat treating the positive active material to uniform crystalline form (claim 5). The reference does not disclose coating the active material after heating.

However, 1998-288495 teaches the employment of magnesium in lithium oxide electrode materials in the amount of 5%. See the Abstract..

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the magnesium additive of JP 1998-288495, in the positive electrode of Miyasaka, in order to improve thermal stability and/or increase capacity of the electrode material.

With respect to coating the electrode material after heating, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to coat the electrode after heating, since selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results); In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

With respect to heat treating the cathode material to uniform crystalline form, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to heat treat the material of Miyasaka to uniform crystalline form, to facilitate intercalation and de-intercalation of lithium ions from the electrode material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 29, 30, 33 & 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saidi et al., U.S. Patent 5, 851,696 in view of JP 1998-288495.

Saidi teaches a rechargeable lithium battery (abstract). With respect to claim 5, Saidi teaches a slurry composition comprising: a physical mixture of a positive active material including LiMnO_4 , LiCoO_2 , LiNiO_2 , LiNiVO_4 , LiCoVO_4 , LiCoNiO_2 or LiTmO_2 where Tm is a transition metal or combination of transition metals (col. 6, lines 10-20); a binder (col. 9, lines 10-15); a carbon conductive agent (col. 9, lines 15-20); and an organic solvent (col. 9, lines 65-68); coated onto a current collector and dried (col. 9, lines 15-21 & 60-68); and the positive active material includes LiCoO_2 (instant formula 3), LiNiO_2 (instant formula 3) or LiCoNiO_2 (instant formula 11). See column 6, lines 10-20. With respect to claim 29, the active material is LiCoO_2 embracing the formula Li_xBA_2 when $x=1$ and A is oxygen (col. 6, lines 10-20). With respect to claim 30, the active material is LiCoO_2 embracing the formula $\text{Li}_x\text{BO}_{2-z}\text{A}_z$ when $x=1$ and A is oxygen (col. 6, lines 10-20). With respect to claim 33, the active material is LiCoNiO_2 ,

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embracing the formula $\text{Li}_x\text{NiCoA}_2$ when $x=1$ and A is oxygen (col. 6, lines 10-20). With respect to claim 34, the active material is LiCoNiO_2 , embracing the formula $\text{Li}_x\text{NiCoO}_{2-z}\text{A}_z$ when $x=1$ and A is oxygen (col. 6, lines 10-20).

Saidi is silent to an electrode additive of at least one of Si, B, Ti, Ga, Ge, Ca, Mg, Sr and Ba, in an amount of 0.01 to 10wt% (claim 5). The reference is also silent to coating the electrode composition after heating (claim 5) to form a positive active material of uniform crystalline form (claim 5).

However, JP 1998-288495 teaches the employment of silicon in lithium oxide electrode materials in the amount of 5%. See the Abstract.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the silicon additive of JP 1998-288495, in the positive electrode of Saidi, in order to improve thermal stability and/or increase capacity of the electrode material.

With respect to heat treating the cathodic material, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to heat the positive electrode material of Saidi, in order to remove impurities from the electrode particles. With respect to coating the electrode material after heating, the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. *In re Gibson*, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

With respect to heat treating the cathode material to uniform crystalline form, it would have been obvious to one of ordinary skill in the art at the time the instant

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invention was made to heat treat the material of Saidi to uniform crystalline form, to facilitate intercalation and de-intercalation of lithium ions from the electrode material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saidi et al., U.S. Patent 5, 851,696 in view of JP 1998-288495 and further in view of Matsubara U.S. Pub. 2001/0010807.

Saidi in view of JP 1998-288495 teach an active slurry composition as described hereinabove. Saidi teaches a positive active material comprising LiTmO_2 , where Tm is a combination of transition metals (col. 6, lines 15-20).

Saidi does not expressly disclose a lithium nickel/cobalt material of the formula $\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}^n\text{A}_2$.

However, Matsubara teaches that it is conventional to employ lithium nickel/cobalt oxides of the formula $\text{Li}_y\text{Ni}_{1-x}\text{Co}_{x1}\text{M}_{x2}\text{O}_2$ where M is Al, Fe, Mn where y is $0.9 < y < 1.3$ and $0 < x < 0.5$ (¶ 13-14). This compound improves the charging and

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discharging cycle characteristics of the positive electrode so that it retains high battery capacity (abstract).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the instant compound, because even though Saidi does not specifically teach $\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}^n\text{A}_2$, Matsubara teaches that material of this formula improves the charging and discharging cycle characteristics and battery capacity.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 9, & 29-32 are rejected under 35 U.S.C. 103(a) being unpatentable over Goshu et al. U.S. Patent 6,589,694 and further in view of JP 1998-288495. Goshu teaches a positive active material comprising LiCoO_2 , LiNiO_2 , $\text{LiCo}_{1-x}\text{Ni}_x\text{O}_2$, wherein $0.1 < x$ and $y < 0.1$ (col. 6, lines 15-23). With respect to claim 5, The active material is prepared by mixing a binder, carbon black and N-methyl-2-pyrrolidone to form a slurry (col. 19, lines 45-55), the slurry is applied onto both surfaces of a current collector and dried (col. 19, lines 45-55), and the positive active material includes LiCoO_2 (instant formula 3), LiNiO_2 (instant formula 3) or LiCoNiO_2 (instant formula 11). See column 6,

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lines 15-23. The electrode material is heat treated prior to coating on the current collector. See Examples 1-4. With respect to claim 9, the organic solvent is N-methylpyrrolidone (col. 19, lines 50-55). With respect to claim 29, the active material is LiCoO_2 embracing the formula Li_xBA_2 when $x=1$ and A is oxygen (col. 6, lines 15-23). With respect to claim 30, the active material is LiCoO_2 embracing the formula $\text{Li}_x\text{BO}_{2-z}\text{A}_z$ when $x=1$ and A is oxygen (col. 6, lines 15-23). With respect to claim 31 & 32, the active material is $\text{LiNi}_{1-x}\text{Al}_x\text{O}_2$, embracing the formula $\text{Li}_x\text{B}_{1-y}\text{M}^y\text{A}_z$ when B is Ni, M^y is Al and A is O (col. 6, lines 15-23).

Gosho is silent to an electrode additive of at least one of Si, B, Ti, Ga, Ge, Ca, Mg, Sr and Ba (claim 5) in an amount of 0.01 to 10 wt% (claim 5). The reference does not expressly disclose heat treating the positive active material to uniform crystalline form (claim 5).

However, JP 1998-288495 teaches the employment of magnesium in lithium oxide electrode materials in the amount of 5% . . . See the Abstract..

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the magnesium additive of JP 1998-288495 , in the positive electrode of Gosho, in order to improve thermal stability and/or increase capacity of the electrode material.

With respect to heat treating the cathode material to uniform crystalline form, it would have been obvious to one of ordinary skill in the art at the time the instant

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invention was made to heat treat the material of Gosho to uniform crystalline form, to facilitate intercalation and de-intercalation of lithium ions from the electrode material.

Response to Arguments

Applicant's arguments with respect to claims 5, 9 & 29-35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (571) 272-1309. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Patrick Ryan, may be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MW

5/22/07



PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER